

❖ Problems

- Q 1. Derive and discuss the Schrodinger wave equation for a particle of mass m trapped inside a cubical box with side a . Provided that the potential inside the box is zero while outside the box is infinite.
- Q 2. Discuss the concept of the degeneracy of quantum mechanical states in a 3D box.
- Q 3. What is the zero-point energy of a simple harmonic oscillator? How does it vary with force constant?
- Q 4. Derive and discuss the Schrodinger wave equation for a diatomic rigid rotator. Also, draw the energy level diagram for the same.
- Q 5. Define space quantization with special reference to diatomic rigid rotator.
- Q 6. What is the difference between the radial and angular wave function for hydrogen atom? Write down both parts for $3d_z^2$ orbital.
- Q 7. What are quantum numbers in the modern wave mechanical model of the atom? Also, discuss the main significance of the principal quantum number.
- Q 8. Write down a short note on “probability distribution functions”.
- Q 9. What are “radial distribution functions”? Also, explain how you would determine the radius of maximum probability for $1s$ orbital of the hydrogen atom.
- Q 10. What are the formulas to find the number of angular and radial nodes?
- Q 11. Draw and discuss the shape of $4d_{xy}$ and $3d_z^2$ in detail

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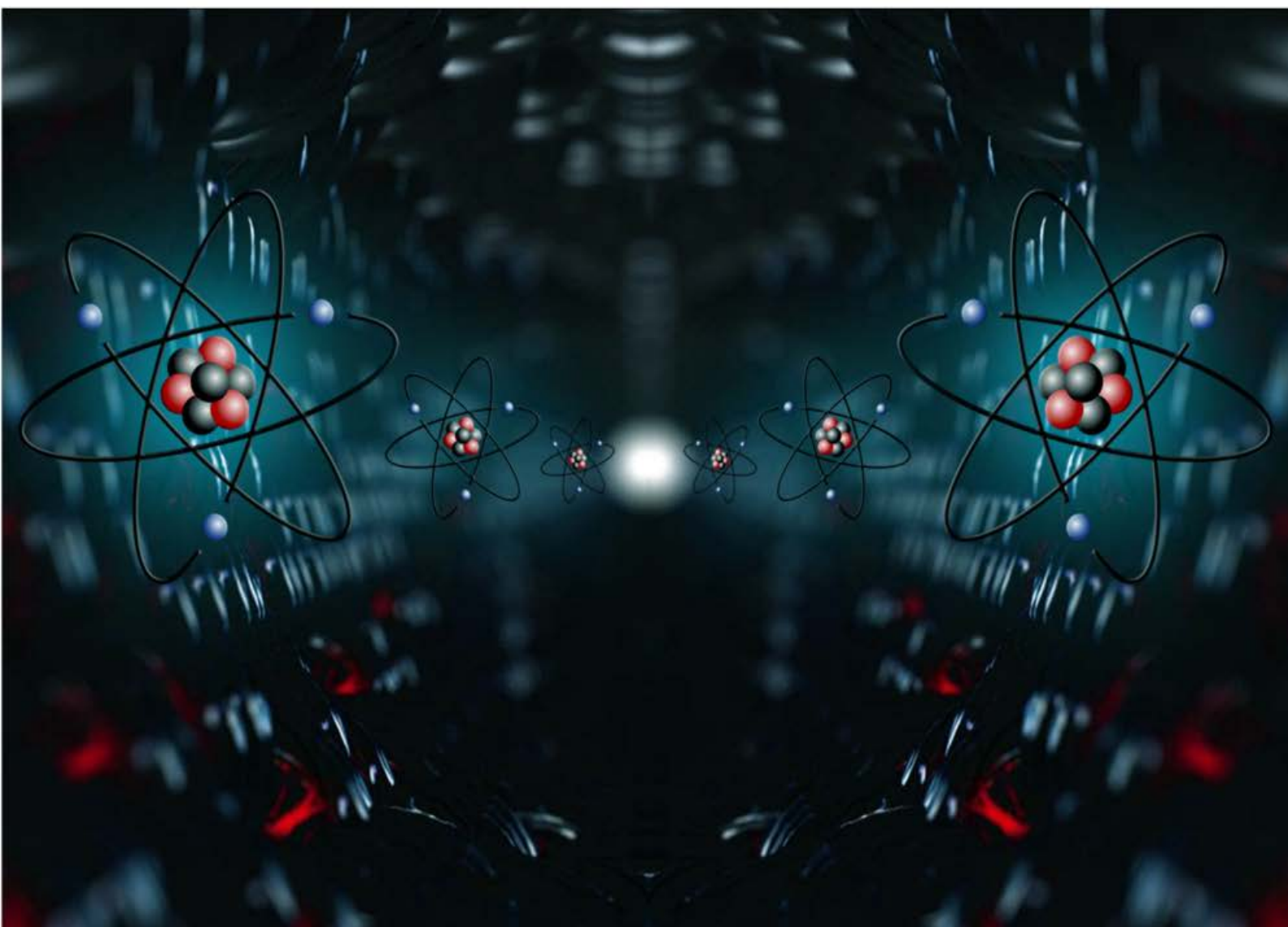
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A TEXTBOOK OF PHYSICAL CHEMISTRY

Volume I

MANDEEP DALAL



First Edition

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Mandeep Dalal

(M.Sc, Ph.D, CSIR UGC - NET JRF, IIT - GATE)

Founder & Director, Dalal Institute

Contact No: +91-9802825820

Homepage: www.mandeepdalal.com

E-Mail: dr.mandeep.dalal@gmail.com

Mandeep Dalal is an Indian research scholar who is primarily working in the field of Science and Philosophy. He received his Ph.D in Chemistry from Maharshi Dayanand University, Rohtak, in 2018. He is also the Founder and Director of "Dalal Institute", an India-based educational organization which is trying to revolutionize the mode of higher education in Chemistry across the globe. He has published more than 40 research papers in various international scientific journals, including mostly from Elsevier (USA), IOP (UK) and Springer (Netherlands).

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